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FILE COVERS 1907 - 14 Jan 2008 VOL 148 ISS 3  
FILE LAST UPDATED: 13 Jan 2008 (20080113/ED)

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This file contains CAS Registry Numbers for easy and accurate substance identification.

```
=> s multiply(w)twinned
    14329 MULTIPLY
    6762 TWINNED
L1    345 MULTIPLY(W) TWINNED

=> s l1 and (platinum or pt)
    229024 PLATINUM
    254646 PT
L2    28 L1 AND (PLATINUM OR PT)

=> s l2 and electrode
    537255 ELECTRODE
L3    4 L2 AND ELECTRODE

=> d l3 1-4 ti,ab,bib
```

```
L3  ANSWER 1 OF 4  HCAPLUS  COPYRIGHT 2008 ACS on STN
TI  Microstructure of (104)-oriented Bi3.25La0.75Ti3O12 and Bi3.54Nd0.46Ti3O12
    ferroelectric thin films on multiply twinned SrRuO3/
    Pt(111) electrodes on YSZ(100)-buffered Si(100)
AB  Uniformly (111)-oriented, multiply twinned
    SrRuO3-covered Pt electrodes were grown on YSZ(100) buffer
    layers on Si(100) substrates by a combination of r.f. sputtering and
    pulsed laser deposition (PLD). They provide a smooth and plane substrate
    surface for the growth of multiply twinned, uniformly
    (104)-oriented ferroelec. Bi3.25La0.75Ti3O12 (BLT) and Bi3.54Nd0.46Ti3O12
    (BNT) thin films grown by PLD at an optimum substrate temperature of
    750°. Microstructure, morphol., and crystallog. orientation of the
    SrRuO3/Pt electrodes and the BLT and BNT films are characterized
    by XRD, AFM, TEM, and SAED. In spite of the multiply
    twinned structure, the entire ferroelec. film has a uniform
    component P1 of the polarization vector perpendicular to the film
    plane. The (104)-oriented BLT and BNT films on electroded Si(100) are
    shown to have good ferroelec. properties (remanent polarization, coercive
    field, fatigue resistance) and are thus suitable for applications in
    Si-based technologies.
AN  2005:1136654  HCAPLUS
DN  143:413854
```

TI Microstructure of (104)-oriented Bi<sub>3.25</sub>La<sub>0.75</sub>Ti<sub>3</sub>O<sub>12</sub> and Bi<sub>3.54</sub>Nd<sub>0.46</sub>Ti<sub>3</sub>O<sub>12</sub>  
ferroelectric thin films on multiply twinned SrRuO<sub>3</sub>/  
Pt(111) electrodes on YSZ(100)-buffered Si(100)  
AU Hesse, Dietrich; Lee, Sung Kyun; Goesele, Ulrich  
CS Max-Planck-Institut fuer Mikrostrukturphysik, Halle, 06120, Germany  
SO Physica Status Solidi A: Applications and Materials Science (2005),  
202(12), 2287-2298  
CODEN: PSSABA; ISSN: 0031-8965  
PB Wiley-VCH Verlag GmbH & Co. KGaA  
DT Journal  
LA English  
RE.CNT 40 THERE ARE 40 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L3 ANSWER 2 OF 4 HCAPLUS COPYRIGHT 2008 ACS on STN

TI Potential dependent crystal habit of metallic particles formed by  
electrochemical deposition - formation of multiply  
twinned metal and alloy particles in aqueous solution  
AB It is known that Au(100), Au(110), and Au(111) single crystal surfaces  
undergo reconstruction in vacuum by raising temperature and that similar  
reconstruction of the Au surfaces takes place in electrolyte solution,  
depending on the electrode potential. These surface  
reconstructions are rationalized by lowering of surface energy. However,  
it was accepted that the crystal habit owes to relative growth rate of  
crystallog. planes in vacuum as well as in solution, i.e., the crystal habit  
is a kinetic phenomenon. Taking these facts into account, an interesting  
question may arise that whether the crystal habit of Au particles is  
influenced by the potential of electrode on which the particles  
grow. By using Au mesh for TEM as an electrode, not only Au but  
also other metal particles deposited on it under the controlled potential  
were observed by TEM. Multiply twinned particles (MTPs)  
of Au are formed at neg. potential (vs. SCE) but the face centered cubic  
single crystalline Au  
particles are predominantly grown at pos. potential (vs. SCE). This  
phenomenon suggests that the shape of Au particles can be controlled by  
the electrode potential which may regulate the surface energy.  
It is known that the reconstruction of Au surfaces accompanies the lattice  
shortening, and the excess neg. charge at the surface is responsible for  
the lattice shortening. The authors inferred that the similar lattice  
shortening might occur on the face centered cubic metal surfaces at neg.  
potential

although the reconstruction is known only on Au and Pt surfaces.  
The other face centered cubic metals (Pt, Pd, Ag, Cu, Ir, Rh and Ni) also form  
MTPs at neg. electrode potential. AuCu alloyed particles take  
more readily multiply twinned shape than that of Au  
particles, i.e., MTPs of AuCu alloy are formed at pos. potential at which  
no MTPs of Au are formed. This phenomenon is explained by the  
underpotential deposition of Cu<sup>+</sup> ion on Au surface.

AN 2002:950106 HCAPLUS

DN 138:244804

TI Potential dependent crystal habit of metallic particles formed by  
electrochemical deposition - formation of multiply  
twinned metal and alloy particles in aqueous solution  
AU Lu, Da-ling; Tanaka, Ken-ichi  
CS Chemical Resources Laboratory, Tokyo Institute of Technology, Midori-ku,  
Yokohama, 226-8503, Japan  
SO Current Topics in Electrochemistry (2001), 8, 83-141  
CODEN: CTELF8  
PB Research Trends  
DT Journal  
LA English

RE.CNT 337 THERE ARE 337 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L3 ANSWER 3 OF 4 HCAPLUS COPYRIGHT 2008 ACS on STN  
TI Pt + Cu and Pd + Cu alloy particles formed in the underpotential deposition region of Cu<sup>2+</sup> in perchloric acid solution  
AB Formation of Pt + Cu and Pd + Cu alloy particles in acidic solns. at deposition electrode potentials which were located in the underpotential deposition region (upd) of Cu<sup>2+</sup> ion was studied by TEM. The behavior of the fraction of Cu in the alloy particles is similar to that of the Au-Cu alloy particles, i.e., the fraction of Cu is independent of concentration of Cu<sup>2+</sup> ion in solution but is dependent of deposition potential in the upd region of Cu<sup>2+</sup> ion. This correlation can be described by an exptl. formula. Unlike the case of the Au + Cu alloy particles, the authors did not find the multiply twinned particles (MTPs) of Pt + Cu alloy particles. The MTPs of Pd + Cu alloy particles were observed. However, these MTPs were not stable and changed to polycryst. material quickly during the observation by TEM. Ag + Cu alloy particles were not formed in the upd region of Cu<sup>2+</sup> ion.  
AN 1998:431758 HCAPLUS  
DN 129:181388  
TI Pt + Cu and Pd + Cu alloy particles formed in the underpotential deposition region of Cu<sup>2+</sup> in perchloric acid solution  
AU Lu, Da-Ling; Ichihara, Masaki; Tanaka, Ken-ichi  
CS Inst. Solid State Physics, Univ. Tokyo, Tokyo, 106, Japan  
SO Electrochimica Acta (1998), 43(16-17), 2325-2330  
CODEN: ELCAAV; ISSN: 0013-4686  
PB Elsevier Science Ltd.  
DT Journal  
LA English  
RE.CNT 34 THERE ARE 34 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L3 ANSWER 4 OF 4 HCAPLUS COPYRIGHT 2008 ACS on STN  
TI Au, Cu, Ag, Ni, and Pd Particles Grown in Solution at Different Electrode Potentials  
AB The multiply twinned particles (MTPs) of Cu, Ni, Ag, and Pd formed on an electrode in solution at low electrode potentials were systematically studied by TEM. At low electrode potentials the icosahedral and decahedral particles were observed for gold, silver, and palladium, but only the decahedral particles were observed for copper and nickel. The icosahedral particles of copper and nickel are less stable compared to the decahedral particles. The decahedral Ag particles were oxidized during the observation by TEM and changed into Ag<sub>2</sub>O having face centered cubic structure. The stability of these transition metal MTPs formed in solution is in the sequence Au > Ag > Cu and Pt > Pd > Ni. The differences of d-s hybridization or s,p-d hybridization among 3d, 4d, and 5d transition metals will increase the surface electron d., which results in the contraction of the lattice in the lateral direction. The decahedral and icosahedral particles of Au were formed on an SnO<sub>2</sub> electrode, which indicates that the MTPs of Au are grown not only on carbon film but on SnO<sub>2</sub> film depending on the electrode potential.  
AN 1997:276278 HCAPLUS  
DN 126:335862  
TI Au, Cu, Ag, Ni, and Pd Particles Grown in Solution at Different Electrode Potentials  
AU Lu, Da-ling; Tanaka, Ken-ichi  
CS Institute for Solid State Physics, University of Tokyo, Tokyo, 106, Japan  
SO Journal of Physical Chemistry B (1997), 101(20), 4030-4034  
CODEN: JPCBPK; ISSN: 1089-5647  
PB American Chemical Society  
DT Journal

LA English

RE.CNT 44 THERE ARE 44 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

=> d hist

(FILE 'HOME' ENTERED AT 13:32:03 ON 14 JAN 2008)

FILE 'HCAPLUS' ENTERED AT 13:32:18 ON 14 JAN 2008

L1 345 S MULTIPLY(W) TWINNED  
L2 28 S L1 AND (PLATINUM OR PT)  
L3 4 S L2 AND ELECTRODE

=> s l2 and fuel(w) cell

424790 FUEL  
2330718 CELL  
73522 FUEL(W) CELL  
L4 0 L2 AND FUEL(W) CELL

=> s l2 and carbon

1334218 CARBON  
L5 4 L2 AND CARBON

=> s l3 not l5

L6 3 L3 NOT L5

=> s l5 not l3

L7 3 L5 NOT L3

=> d l7 1-3 ti,ab,bib

L7 ANSWER 1 OF 3 HCAPLUS COPYRIGHT 2008 ACS on STN  
TI The investigation of multiply twinned L10-type FePt  
nanoparticles by transmission electron microscopy  
AB Thin films of FePt nanoparticles were prepared by co-deposition of Fe and  
Pt on to amorphous C films kept at 350°. As-prepared films  
were composed of disordered Fe-Pt nanoparticles with a face centered cubic  
structure, where twinned and multiply twinned Fe-  
Pt nanoparticles could be identified by TEM and electron  
diffraction. Atomic ordering from face centered cubic to L10 structure was  
followed by  
in-situ TEM observation during heating up to 750°.  
Multiply twinned (fivefold) nanoparticles of the L10  
FePt were observed for the 1st time by high-resolution TEM observation. In  
these nanoparticles the crystallog. c axes of L10 structure is oriented  
parallel to the film plane in each segment. The stability of the 5-fold  
FePt nanoparticles is briefly discussed.

AN 2004:483786 HCAPLUS

DN 141:304538

TI The investigation of multiply twinned L10-type FePt  
nanoparticles by transmission electron microscopy

AU Kovacs, A.; Sato, K.; Safran, G.; Barna, P. B.; Hirotsu, Y.

CS Research Institute for Technical Physics and Materials Science, Hungarian  
Academy of Sciences, Budapest, H-1121, Hung.

SO Philosophical Magazine (2004), 84(20), 2075-2081

CODEN: PMHABF; ISSN: 1478-6435

PB Taylor & Francis Ltd.

DT Journal

LA English

RE.CNT 18 THERE ARE 18 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L7 ANSWER 2 OF 3 HCAPLUS COPYRIGHT 2008 ACS on STN  
 TI Structure and Chemical Composition of Surfactant-Stabilized PtRu Alloy Colloids  
 AB In situ XRD has been used to study both unsupported and silica-supported clusters PtRu[N(Oct)4Cl]5 (Pt:Ru  $\approx$  1:1). Structural information has been gained by Debye function anal. For the unsupported clusters, the best fit simulation gives a 50/50 mixture of colloid particles with fcc symmetry and multiply twinned decahedral particles. The narrow size distribution centers around 12 Å. The near-neighbor distance is found to be 0.9% smaller than for the bulk PtRu. XANES data provide evidence for the metallic character of the Pt component. The silica-supported colloid particles oxidize rapidly in air to form an amorphous state but can be rereduced in hydrogen at room temperature. An "open-slit" XRD technique was used to study the particle growth in H<sub>2</sub> and He. Particles annealed to 700 °C in He show a twinned fcc symmetry with an average size of 23 Å. The CO oxidation of this catalyst was studied by in situ XRD. At 280 °C surface oxide species are formed that slowly coalesce to RuO<sub>2</sub> particles. After reredn. the catalyst consists of a pure hcp ruthenium phase and larger alloy particles enriched in platinum.

AN 1998:16217 HCAPLUS  
 DN 128:80325  
 TI Structure and Chemical Composition of Surfactant-Stabilized PtRu Alloy Colloids  
 AU Vogel, W.; Britz, P.; Boennemann, H.; Rothe, J.; Hormes, J.  
 CS Fritz-Haber-Institut der Max-Planck-Gesellschaft, Berlin, 14195, Germany  
 SO Journal of Physical Chemistry B (1997), 101(51), 11029-11036  
 CODEN: JPCBFK; ISSN: 1089-5647  
 PB American Chemical Society  
 DT Journal  
 LA English

RE.CNT 46 THERE ARE 46 CITED REFERENCES AVAILABLE FOR THIS RECORD  
 ALL CITATIONS AVAILABLE IN THE RE FORMAT

L7 ANSWER 3 OF 3 HCAPLUS COPYRIGHT 2008 ACS on STN  
 TI Epitaxially grown model catalyst particles of platinum, rhodium, iridium, palladium and rhenium studied by electron microscopy  
 AB In order to obtain oriented thin film model catalysts, small particles of Pt, Rh, Ir, Pd and Re (2-20 nm in size) were grown by high vacuum evaporation on NaCl cleavage faces or on in situ deposited NaCl films at 523-673 K. The particles were covered with a supporting film of Al<sub>2</sub>O<sub>3</sub> or carbon and removed from the substrate. High resolution electron microscopy, selected area electron diffraction and weak-beam dark-field imaging were applied to determine the particular morphol., microstructure and orientation of the observed particles. Special attention was paid to Rh particles which appear in a variety of shapes. Pt, Ir and Pd model catalyst consist mainly of (001) oriented half octahedra which may exhibit truncations at the corners or on the top. This was also the dominant shape of Rh particles but in addition half tetrahedra in (001) epitaxy and multiply-twinned particles like decahedra in (001), (011) and (111) orientation were evident. These habits provide a definite initial state for study of the changes in structure and morphol. of the particles during activating heat treatments necessary to induced catalytic activity of the Al<sub>2</sub>O<sub>3</sub> supported metal films. Although Re films consisted of irregularly shaped particles, electron diffraction revealed a partial epitaxial alignment of both c.p.h. and face centered cubic

Re.  
 AN 1995:640098 HCAPLUS  
 DN 123:180241  
 TI Epitaxially grown model catalyst particles of platinum, rhodium, iridium, palladium and rhenium studied by electron microscopy  
 AU Rupprechter, G.; Hayek, K.; Rendon, L.; Jose-Yacamán, M.  
 CS Institut Physikalische Chemie, Universitaet Innsbruck, Innsbruck, A-6020,

Austria  
SO Thin Solid Films (1995), 260(2), 148-55  
CODEN: THSFAP; ISSN: 0040-6090  
PB Elsevier  
DT Journal  
LA English

=> s multiply(w)twinned(w)platinum  
14329 MULTIPLY  
6762 TWINNED  
229024 PLATINUM  
L8 0 MULTIPLY (W) TWINNED (W) PLATINUM

=> d l5 1-4 ti,ab,bib

L5 ANSWER 1 OF 4 HCAPLUS COPYRIGHT 2008 ACS on STN  
TI The investigation of multiply twinned L10-type FePt  
nanoparticles by transmission electron microscopy  
AB Thin films of FePt nanoparticles were prepared by co-deposition of Fe and  
Pt on to amorphous C films kept at 350°. As-prepared films  
were composed of disordered Fe-Pt nanoparticles with a face centered cubic  
structure, where twinned and multiply twinned Fe-  
Pt nanoparticles could be identified by TEM and electron  
diffraction. Atomic ordering from face centered cubic to L10 structure was  
followed by

in-situ TEM observation during heating up to 750°.  
Multiply twinned (fivefold) nanoparticles of the L10  
FePt were observed for the 1st time by high-resolution TEM observation. In  
these nanoparticles the crystallog. c axes of L10 structure is oriented  
parallel to the film plane in each segment. The stability of the 5-fold  
FePt nanoparticles is briefly discussed.

AN 2004:483786 HCAPLUS  
DN 141:304538  
TI The investigation of multiply twinned L10-type FePt  
nanoparticles by transmission electron microscopy  
AU Kovacs, A.; Sato, K.; Safran, G.; Barna, P. B.; Hirotsu, Y.  
CS Research Institute for Technical Physics and Materials Science, Hungarian  
Academy of Sciences, Budapest, H-1121, Hung.  
SO Philosophical Magazine (2004), 84(20), 2075-2081  
CODEN: PMHABF; ISSN: 1478-6435  
PB Taylor & Francis Ltd.  
DT Journal  
LA English

RE.CNT 18 THERE ARE 18 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L5 ANSWER 2 OF 4 HCAPLUS COPYRIGHT 2008 ACS on STN  
TI Structure and Chemical Composition of Surfactant-Stabilized PtRu Alloy  
Colloids  
AB In situ XRD has been used to study both unsupported and silica-supported  
clusters PtRu[N(Oct)4Cl]5 (Pt:Ru  $\approx$  1:1). Structural  
information has been gained by Debye function anal. For the unsupported  
clusters, the best fit simulation gives a 50/50 mixture of colloid particles  
with fcc symmetry and multiply twinned decahedral  
particles. The narrow size distribution centers around 12 Å. The  
near-neighbor distance is found to be 0.9% smaller than for the bulk PtRu.  
XANES data provide evidence for the metallic character of the Pt  
component. The silica-supported colloid particles oxidize rapidly in air  
to form an amorphous state but can be rereduced in hydrogen at room temperature  
An "open-slit" XRD technique was used to study the particle growth in H2  
and He. Particles annealed to 700 °C in He show a twinned fcc  
symmetry with an average size of 23 Å. The CO oxidation of this catalyst was

studied by in situ XRD. At 280 °C surface oxide species are formed that slowly coalesce to RuO<sub>2</sub> particles. After reredn. the catalyst consists of a pure hcp ruthenium phase and larger alloy particles enriched in platinum.

AN 1998:16217 HCAPLUS

DN 128:80325

TI Structure and Chemical Composition of Surfactant-Stabilized PtRu Alloy Colloids

AU Vogel, W.; Britz, P.; Boennemann, H.; Rothe, J.; Hormes, J.

CS Fritz-Haber-Institut der Max-Planck-Gesellschaft, Berlin, 14195, Germany.

SO Journal of Physical Chemistry B (1997), 101(51), 11029-11036

CODEN: JPCBFK; ISSN: 1089-5647

PB American Chemical Society

DT Journal

LA English

RE.CNT 46 THERE ARE 46 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L5 ANSWER 3 OF 4 HCAPLUS COPYRIGHT 2008 ACS on STN

TI Au, Cu, Ag, Ni, and Pd Particles Grown in Solution at Different Electrode Potentials

AB The multiply twinned particles (MTPs) of Cu, Ni, Ag, and Pd formed on an electrode in solution at low electrode potentials were systematically studied by TEM. At low electrode potentials the icosahedral and decahedral particles were observed for gold, silver, and palladium, but only the decahedral particles were observed for copper and nickel. The icosahedral particles of copper and nickel are less stable compared to the decahedral particles. The decahedral Ag particles were oxidized during the observation by TEM and changed into Ag<sub>2</sub>O having face centered cubic

structure. The stability of these transition metal MTPs formed in solution is in the sequence Au > Ag > Cu and Pt > Pd > Ni. The differences of d-s hybridization or s,p-d hybridization among 3d, 4d, and 5d transition metals will increase the surface electron d., which results in the contraction of the lattice in the lateral direction. The decahedral and icosahedral particles of Au were formed on an SnO<sub>2</sub> electrode, which indicates that the MTPs of Au are grown not only on carbon film but on SnO<sub>2</sub> film depending on the electrode potential.

AN 1997:276278 HCAPLUS

DN 126:335862

TI Au, Cu, Ag, Ni, and Pd Particles Grown in Solution at Different Electrode Potentials

AU Lu, Da-ling; Tanaka, Ken-ichi

CS Institute for Solid State Physics, University of Tokyo, Tokyo, 106, Japan

SO Journal of Physical Chemistry B (1997), 101(20), 4030-4034

CODEN: JPCBFK; ISSN: 1089-5647

PB American Chemical Society

DT Journal

LA English

RE.CNT 44 THERE ARE 44 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L5 ANSWER 4 OF 4 HCAPLUS COPYRIGHT 2008 ACS on STN

TI Epitaxially grown model catalyst particles of platinum, rhodium, iridium, palladium and rhenium studied by electron microscopy

AB In order to obtain oriented thin film model catalysts, small particles of Pt, Rh, Ir, Pd and Re (2-20 nm in size) were grown by high vacuum evaporation on NaCl cleavage faces or on in situ deposited NaCl films at 523-673 K. The particles were covered with a supporting film of Al<sub>2</sub>O<sub>3</sub> or carbon and removed from the substrate. High resolution electron microscopy, selected area electron diffraction and weak-beam dark-field imaging were applied to determine the particular morphol., microstructure and orientation of the observed particles. Special attention was paid to Rh

particles which appear in a variety of shapes. Pt, Ir and Pd model catalyst consist mainly of (001) oriented half octahedra which may exhibit truncations at the corners or on the top. This was also the dominant shape of Rh particles but in addition half tetrahedra in (001) epitaxy and multiply-twinned particles like decahedra in (001), (011) and (111) orientation were evident. These habits provide a definite initial state for study of the changes in structure and morphol. of the particles during activating heat treatments necessary to induced catalytic activity of the Al<sub>2</sub>O<sub>3</sub> supported metal films. Although Re films consisted of irregularly shaped particles, electron diffraction revealed a partial epitaxial alignment of both c.p.h. and face centered cubic

Re.  
AN 1995:640098 HCAPLUS  
DN 123:180241  
TI Epitaxially grown model catalyst particles of platinum, rhodium, iridium, palladium and rhenium studied by electron microscopy  
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CS Institut Physikalische Chemie, Universitaet Innsbruck, Innsbruck, A-6020, Austria  
SO Thin Solid Films (1995), 260(2), 148-55  
CODEN: THSFAP; ISSN: 0040-6090  
PB Elsevier  
DT Journal  
LA English

=>



```
=> s twinned(w)particle(w) (platinum or pt)
      6762 TWINNED
      782997 PARTICLE
      229024 PLATINUM
      254646 PT
L9      0 TWINNED (W) PARTICLE (W) (PLATINUM OR PT)
```

```
=> s twinned(w)particle(w)platinum
      6762 TWINNED
      782997 PARTICLE
      229024 PLATINUM
L10     0 TWINNED (W) PARTICLE (W) PLATINUM
```

```
=> s twinned(w)particle
      6762 TWINNED
      782997 PARTICLE
L11     59 TWINNED (W) PARTICLE
```

```
=> s l11 and platinum
      229024 PLATINUM
L12     1 L11 AND PLATINUM
```

```
=> d l12 ti,ab,bib
```

L12 ANSWER 1 OF 1 HCAPLUS COPYRIGHT 2008 ACS on STN

TI Potential dependent crystal habit of metallic particles formed by electrochemical deposition - formation of multiply twinned metal and alloy particles in aqueous solution

AB It is known that Au(100), Au(110), and Au(111) single crystal surfaces undergo reconstruction in vacuum by raising temperature and that similar reconstruction of the Au surfaces takes place in electrolyte solution, depending on the electrode potential. These surface reconstructions are rationalized by lowering of surface energy. However, it was accepted that the crystal habit owes to relative growth rate of crystallog. planes in vacuum as well as in solution, i.e., the crystal habit is a kinetic phenomenon. Taking these facts into account, an interesting question may arise that whether the crystal habit of Au particles is influenced by the potential of electrode on which the particles grow. By using Au mesh for TEM as an electrode, not only Au but also other metal particles deposited on it under the controlled potential were observed by TEM. Multiply twinned particles (MTPs) of Au are formed at neg. potential (vs. SCE) but the face centered cubic

single crystalline Au particles are predominantly grown at pos. potential (vs. SCE). This phenomenon suggests that the shape of Au particles can be controlled by the electrode potential which may regulate the surface energy. It is known that the reconstruction of Au surfaces accompanies the lattice shortening, and the excess neg. charge at the surface is responsible for the lattice shortening. The authors inferred that the similar lattice shortening might occur on the face centered cubic metal surfaces at neg.

potential although the reconstruction is known only on Au and Pt surfaces. The other face centered cubic metals (Pt, Pd, Ag, Cu, Ir, Rh and Ni) also form MTPs at neg. electrode potential. AuCu alloyed particles take more readily multiply twinned shape than that of Au particles, i.e., MTPs of AuCu alloy are formed at pos. potential at which no MTPs of Au are formed. This phenomenon is explained by the underpotential deposition of Cu<sup>+</sup> ion on Au surface.

AN 2002:950106 HCAPLUS

DN 138:244804

TI Potential dependent crystal habit of metallic particles formed by electrochemical deposition - formation of multiply twinned metal and alloy

particles in aqueous solution  
AU Lu, Da-ling; Tanaka, Ken-ichi  
CS Chemical Resources Laboratory, Tokyo Institute of Technology, Midori-ku,  
Yokohama, 226-8503, Japan  
SO Current Topics in Electrochemistry (2001), 8, 83-141  
CODEN: CTELFB  
PB Research Trends  
DT Journal  
LA English  
RE.CNT 337 THERE ARE 337 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

=>